Hong Kong Competitive Specification —— Phase A

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ABSTRACT: This specification identifies the approved deviations from applicable Digital standards for manufacture of products in the Hong Kong plant. These deviations are grouped according to component, product, and process.

APPLICABILITY: This document applies only to the Hong Kong plant. All current Digital standards will be followed except as specifically noted in this document. This document is to be used in conjunction with the product matrix Engineering specification, which relates the opportunities to specific products.

STATUS: APPROVED 23-SEP-1991; use VTX SMC for current status.

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1 INTRODUCTION

In order to manufacture competitive products, a core team composed of members from Digital GIA manufacturing in the United States and the Far East developed, evaluated, and tested modifications to manufacturing practices required by current Digital standards and specifications.

1.1 PURPOSE

In an effort to manufacture competitive commodity products this specification identifies and describes the approved deviations from applicable Digital standards and specifications accepted for the manufacture of these products.

1.2 SCOPE

The approved deviations are grouped under three headings: component, product, and process. This specification identifies the deviations, provides a brief background for each deviation, and lists the current Digital documentation affected.

1.3 DEFINITIONS

The following terms are used in this document.

No Risk Process:
All deviations will be tested in the product or confirmed by testing in similar products to ensure that there is no impact to quality, reliability or regulatory requirements.

Core Team:
GIA Group Quality Manager, HKO Plant Manager, TAO Plant Manager, ZGO Plant Manager, GIA Group M.E.Manager, GIA Group CE/VQE Manager, VIPPS And GIA Group Manufacturing Manager

PNRF:
Part Number Request Form

SPOC:
Specifications on Computer

MRCI:
Machine Readable Component Information

1.4 APPLICABILITY

This specification applies only to those products identified within the Hong Kong manufacturing plant and to those products using a specific manufacturing process. The product must pass the "No Risk" process. Products introduced into the same manufacturing plant after the release of this specification and using the same manufacturing process may use the deviations identified in this specification provided they pass the No Risk process and receive the approval of the Core team, through a change to the product matrix Engineering Specification.

2 COMPONENT DEVIATIONS

2.1 DEVIATION: PERFORM LIMITED QUALIFICATION

Check only key parameters critical to form, fit, or function of the component in the application. Refer to other sources of data (such as vendor's datalog, other Digital lab's evaluation report) to verify specified noncritical parameters. The qualification report shall indicate the basis for selecting key parameters.

2.1.1 Background

Data from a reliable supplier is adequate assurance for noncritical parameters. Digital qualification procedures can be simplified if formal testing of these parameters is omitted.

2.1.2 Standards and Other Documents Affected

- Class 10
  - A-PS-1000001-GS
  - A-PS-1000002-GS
  - A-PS-1000003-GS
  - A-PS-1000101-GS
  - A-PS-1000100-GS
  - A-PS-1000103-GS
  - A-PS-1000104-GS
- Class 11
  - A-PS-1100002-GS
  - A-PS-1100003-GS
  - A-PS-1100004-GS
  - A-PS-1100005-GS
  - A-QP-110000A-0-0
- Class 12
  - A-PS-1200008-GS
  - A-PS-1200011-GS
  - A-PS-1200012-GS
  - A-PS-1200015-GS
  - A-PS-1200016-GS
  - A-PS-1200027-GS
  - A-PS-1200028-GS
  - A-PS-1200029-GS
  - A-PS-1200031-GS
  - A-PS-1200043-GS

  - A-PS-1200044-GS
- Class 13
  - A-PS-1300000-GS
  - A-PS-1300001-GS
  - A-PS-1300004-GS
  - A-PS-1300005-GS
  - A-PS-1300007-GS
  - A-PS-1300009-GS
  - A-PS-1300010-GS
  - A-PS-1300011-GS
  - A-PS-1300012-GS
  - A-PS-1300015-GS
- Class 15
  - A-PS-1500002-GS
  - A-PS-1500003-GS
  - A-PS-1500004-GS
  - A-QP-150000A-0-0
- Class 16
  - A-PS-1600002-GS
  - A-PS-1600003-GS
  - A-PS-1600004-GS
- Class 17
  - A-PS-1710000-GS
  - A-PS-1710001-GS
- Class 18
  - A-PS-1805501-0-0
  - A-PS-1805502-GS
  - A-PS-1805503-GS
  - A-PS-1805504-GS
  - A-PS-1805505-GS
  - A-PS-1805506-GS
  - A-PS-1805507-GS
  - A-QP-180000B-0-0
- Class 50
  - DEC STD 176

- Class 74
  - — DEC STD 092 Finish and Color Standard - Introduction and General Requirements
- Class 90
  - — A-PS-9000020-GS
  - — A-PS-9000019-GS
  - — A-PS-9000009-GS
  - — A-PS-9000010-GS
- Class 91
  - — A-PS-9100000-GS
  - — A-PS-9100001-GS
  - — A-PS-9100002-GS
  - — A-PS-9100003-GS
  - — A-PS-9100004-GS
  - — A-PS-9100005-GS
  - — A-PS-9100006-GS
  - — A-PS-9100008-GS

Proposed Deviation

a. Class 10

The following tests will be omitted if vendor or Digital lab has submitted the test data:

1. Marking permanence test
2. Lead wire pull/bend test
3. Moisture resistance test
4. Vibration test
5. Temperature cycling test
6. Resistance to solder heat test

The following tests will be treated as critical parameters. Tests for these parameters shall be done, and data logs shall be recorded in the qualification report.

1. Dimensions measurement
2. Solderability test
3. All electrical tests
4. Life test

b. Class 11

The following tests will be omitted if a vendor or Digital lab has submitted the test data:

1. Marking permanence test
2. Lead wire pull/bend test
3. Resistance to solder heat test
4. Moisture resistance test
5. Temperature cycling test
6. All ac tests

The following tests will be treated as critical parameters. Tests for these parameters shall be done and data logs shall be recorded in the qualification report.

1. Dimensions measurement
2. All dc tests
3. Life test
4. Solderability test

c. Class 12: Electrical Interconnecting Parts

The following tests will be omitted if a vendor or Digital lab has submitted the test data:

1. Marking permanence test
2. Terminal strength test
3. Vibration test
4. Moisture resistance test
5. Life test
6. Mechanical shock test
7. Temperature cycling test
8. Flammability test

The following tests will be treated as critical parameters. Tests for these parameters shall be done and data logs shall be recorded in the qualification report.

1. Dimensions measurement
2. All DC tests
3. Solderability test

d. Class 12: Noncurrent carrying parts

The following tests will be omitted if a vendor or Digital lab has submitted the test data:

Salt spray test

The following tests will be treated as critical parameters. Tests for these parameters shall be done and datalogs shall be recorded in the qualification report.

Dimensions measurement

e. Class 13

The following tests will be omitted if a vendor or Digital lab has submitted the test data:

1. Marking permanence test
2. Lead wire pull/bend test
3. Vibration test
4. Moisture resistance test
5. Temperature cycling test

The following tests will be treated as critical parameters. Tests for these parameters shall be done and datalogs shall be recorded in the qualification report.

1. Dimensions measurement
2. All dc tests
3. Solderability test
4. Life test

f. Class 15

The following tests will be omitted if a vendor or Digital lab has submitted the test data:

1. Marking permanence test
2. Lead wire pull/bend test
3. Moisture resistance test
4. Vibration test
5. Temperature cycling test
6. All ac tests that are not application critical
7. Resistance to solder heat test
8. Gross leak test

The following tests will be treated as critical parameters. Tests for these parameters shall be done and datalogs shall be recorded in the qualification report.

1. Dimensions measurement
2. All dc tests
3. Solderability test
4. Life test

g. Class 16

The following tests will be omitted if a vendor or Digital lab has submitted the test data:

1. Terminal strength test
2. Marking permanence test
3. Lead strength test
4. Moisture resistance test
5. Mechanical shock test

The following tests will be treated as critical parameters. Tests for these parameters shall be done and datalogs shall be recorded in the qualification report.

1. Dimensions measurement
2. All electrical tests
3. Solderability test
4. Dielectric strength test

h. Class 17/91

The following tests will be omitted if a vendor or Digital lab has submitted the test data:

1. Dimensions measurement
2. Marking permanence test
3. Lead wire pull/bend test
4. Humidity test
5. Flammability test

The following tests will be treated as critical parameters. Tests for these parameters shall be done and datalogs shall be recorded in the qualification report.

1. All dc tests
2. Solderability test
3. Dielectric strength test

i. Class 18

The following tests will be omitted if a vendor or Digital lab has submitted the test data:

1. Marking permanence test
2. Lead wire pull/bend test
3. Vibration test
4. Temperature cycling test
5. Resistance to solder heat test

6. Hermeticity test
7. Mechanical shock test

The following tests will be treated as critical parameters. Tests for these parameters shall be done and datalogs shall be recorded in the qualification report.

1. Dimensions measurement
2. All electrical tests
3. Solderability test
4. Moisture resistance test
5. Life test

j. Class 70/74

The following tests will be omitted if a vendor or Digital lab has submitted the test data:

1. Mechanical shock test
2. Vibration test
3. Salt spray test

The following tests will be treated as critical parameters. Tests for these parameters shall be done and datalogs shall be recorded in the qualification report.

Dimensions measurement

k. Class 90

The following tests will be omitted if a vendor or Digital lab has submitted the test data:

Salt spray test

The following tests will be treated as critical parameters. Tests for these parameters shall be done and datalogs shall be recorded in the qualification report.

Dimensions measurement

2.2 DEVIATION: PERFORM FAMILY QUALIFICATION

Fully qualify selected family representatives of parts that belong to a line of similar supplier products. Once the representatives of the family pass the full qualification test, the whole family can be treated as qualified also. Check only key parameters on new/additional family members after the qualification test is done. The family representative qualification report shall be attached to the qualification report for each additional part.

2.2.1 Background

Data from the qualification of a few representative part types is adequate assurance to qualify similar parameters in similar parts from the same supplier. Digital qualification procedures can be simplified if formal testing of these parameters is not repeated.

2.2.2 Standards and Other Documents Affected

- Class 10
  - A-PS-1000001-GS
  - A-PS-1000002-GS
  - A-PS-1000003-GS
  - A-PS-1000101-GS
  - A-PS-1000100-GS
  - A-PS-1000103-GS
  - A-PS-1000104-GS
- Class 11
  - A-PS-1100002-GS
  - A-PS-1100003-GS
  - A-PS-1100004-GS
  - A-PS-1100005-GS
  - A-QP-110000A-0-0
- Class 12
  - A-PS-1200008-GS
  - A-PS-1200011-GS
  - A-PS-1200012-GS
  - A-PS-1200015-GS
  - A-PS-1200016-GS
  - A-PS-1200027-GS
  - A-PS-1200028-GS
  - A-PS-1200029-GS
  - A-PS-1200031-GS
  - A-PS-1200043-GS
  - A-PS-1200044-GS
- Class 13
  - A-PS-1300000-GS
  - A-PS-1300001-GS
  - A-PS-1300004-GS
  - A-PS-1300005-GS

  - A-PS-1300007-GS
  - A-PS-1300009-GS
  - A-PS-1300010-GS
  - A-PS-1300011-GS
  - A-PS-1300012-GS
  - A-PS-1300015-GS
- Class 15
  - A-PS-1500002-GS
  - A-PS-1500003-GS
  - A-PS-1500004-GS
  - A-QP-150000A-0-0
- Class 16
  - A-PS-1600002-GS
  - A-PS-1600003-GS
  - A-PS-1600004-GS
- Class 17
  - A-PS-1710000-GS
  - A-PS-1710001-GS
- Class 18
  - A-PS-1805501-0-0
  - A-PS-1805502-GS
  - A-PS-1805503-GS
  - A-PS-1805504-GS
  - A-PS-1805505-GS
  - A-PS-1805506-GS
  - A-PS-1805507-GS
  - A-QP-180000B-0-0
- Class 50
  - DEC STD 176 Printed-Wiring Board Acceptance Criteria
- Class 74
  - DEC STD 092 Finish and Color Standard - Introduction and General Requirements
- Class 90
  - A-PS-9000020-GS
  - A-PS-9000019-GS
  - A-PS-9000009-GS
  - A-PS-9000010-GS

- Class 91
  - A-PS-9100000-GS
  - A-PS-9100001-GS
  - A-PS-9100002-GS
  - A-PS-9100003-GS
  - A-PS-9100004-GS
  - A-PS-9100005-GS
  - A-PS-9100006-GS
  - A-PS-9100008-GS

Proposed Deviation

Qualification by reference to the full qualification of a very similar (family) part from the same supplier. Only the critical parameters different from the reference part will be verified.

2.3 DEVIATION: USE ALTERNATE BASE MATERIAL FOR SERIAL LABEL INSTEAD OF ALUMINUM

Use a different base material for serial labels.

Phase A — HKO will generate a waiver or deviation to purchase specification when new construction has been approved. Purchase specifications will not be updated with new construction information due to this change.
Phase B — Update purchase specifications to include the new material.

2.3.1 Background

The Digital facility in Hong Kong will generate a waiver or deviation to the purchase specifications for labels used on existing products when the new construction is approved. The purchase specifications for future applications will be updated with the new construction information.

2.3.2 Standards and Other Documents Affected

The purchase specifications for those serial labels using aluminum as base material will be affected.

a. Change of base material
The base material used on serial labels will be changed
From: 2 mil foil (3m-7804)
To : 4 mil foil, polyester

b. Change of adhesive material
The adhesive material used on serial labels will be changed
From: permanent pressure-sensitive acrylic, 3.5 mil (3m-200 class)
To : permanent pressure-sensitive acrylic, flexcon L-29

2.4 DEVIATION: REMOVE THE NEED OF GENERATING AND MAINTAINING PURCHASE SPECIFICATIONS BY USING INDUSTRIAL STANDARDS FOR 90-CLASS

Develop and load parametric information into the Machine Readable Component Information (MRCI) data base and refer to a hardware manual under development. The generation of a formal purchase specification will not be required. It will deviate from DEC STD 055-0 *Requirements for Purchase Specifications* and DEC STD 156-0 *Introducing New Purchased Parts and Maintaining Purchased Parts Information: Standard Procedures.*

2.4.1 Background

The availability of the MRCI data base for component parametric information eliminates the need to generate purchase specifications for components in the 90-class hardware category. This category consists of industry-standard parts.

2.4.2 Standards and Other Documents Affected

The following are standards affected by the 90 class standards.

- DEC STD-055-0
- DEC STD-156-0

The part description and vendor part number on the QVL shall be sufficient to identify and define the part. When filling in PNRF, specification control should answer "no" against the question, "Does a released purchase specification exist?"

- DEC STD-055-0
  - — Purchase specifications will not be generated for these standard parts.
- DEC STD-156-0
  - — Subhead 1.3.2, Item f

    Original Text
    Ensure that for all new parts, a technically correct purchase specification is created, approved, microfilmed, included in SPOC, and made available to CSCS for microfiching. Reference DEC STD 055-0.
    Proposed Deviation
    Ensure that for all new parts, that part description on SPOC is complete per standard format, and MRCI contains all of the appropriate technical information.
  - — Subhead 5.1.2, Item d

    Original Text
    Ensuring that sufficient data is available to develop a purchase specification; and that performing a subsequent review and approval of the specification is performed when the specification is ready.
    Proposed Deviation
    Ensuring that sufficient data is available to populate MRCI and Standard Part Description fields on SPOC, and that a subsequent review and approval of these fields is performed when ready.

— Subhead 5.1.2, Item h

Original Text
Ensuring that the vendor can technically produce and manufacture the part per Digital specifications and Digital's required volumes.
Proposed Deviation
Ensuring that the vendor can technically produce and manufacture the part per Digital requirements and Digital's required volumes.

3 PRODUCT DEVIATIONS

3.1 DEVIATION: ELIMINATE THE PROCESS VERIFICATION TEST (PVT) INFANCY/STEADY-STATE RELIABILITY ASSESSMENT.

Eliminate minimum 500 hours burn-in test in PVT.

3.1.1 Background

In lieu of the requirement for a unique infancy and steady-state meantime between failures (MTBF) assessment as a part of PVT, specific data will be analyzed in the Reliabiltiy Qualification Test (RQT) to establish the infancy profile and steady-state reliability of the product as a result of the volume manufacturing process. The RQT checks that the intended reliability level has been achieved.

3.1.2 Standards and Other Documents Affected

The document affected by PVT is:

A-MN-ELEN522-00-0 Digital Qualification Process Manual, Subhead 7.1

Original Text

PVT Infancy/Steady-State Reliability Assessment

...If the process is a burn-in test, the units are run for a sufficient period of time (that is,generally a minimum of 500 hours) to establish an infancy profile of the population with adequate confidence to determine the time required to meet the established infancy specification.

Proposed Deviation

In lieu of the PVT infancy/steady-state reliability assessment, the (RQT) data may be used to establish the appropriate infancy removal parameters enabling the plant to meet its goals for infancy and steady-state reliability, if the following criteria are met:

The RQT units were built by the manufacturing plant following an established, documented manufacturing process, and with trained, experienced people.
The RQT criteria (number of units and unit run times) were established following the VAX Request to Send(RTS) Non-Homogeneous-Poisson-Process(NHPP)documented in EL-EN522-00, Digital Qualification Process Manual, heading 6.

Unless another product of similar design/configuration/technology is undergoing Ongoing Reliability Test (ORT), the product will be subjected to ORT so that the reliability and adequacy of the infancy removal process are regularly monitored and adjusted if necessary, to conform to the latest VAXRTS NHPP process.

4 PROCESS DEVIATIONS

4.1 DEVIATION: USE NO-CLEAN, CORED SOLDER, IN HAND SOLDERING STATION

Use no-clean, cored solder, in hand soldering station.

4.1.1 Background

The use of no-clean, cored solder in the hand soldering operation eliminates the need to process modules through a secondary batch or in-line cleaning operation, thereby reducing processing time and associated cleaning and waste treatment costs.

4.1.2 Standards and Other Documents Affected

Standards and other documents affected by this process deviation are:

- DEC STD 116-0, Workmanship Standards Manual-Introduction
- EL-MF299, Printed Circuit Boards/Modules, Cleaning Process Contamination

- DEC-STD 116-1, Workmanship Standard Manual - Printed Circuit Boards.
  - — Subhead 4.1, Contamination

Original Text

4.1 Contamination

Contamination by any foreign material that may affect surface resistivity of the printed circuit assembly is not acceptable. Foreign material shall be removed by thorough cleaning. Particular care shall be taken to eliminate the following :

- — Metal chips
- — Flux concentrations
- — Filings
- — Rosin flakes
- — Clippings
- — Loosen terminal
- — Salt (food residue)
- — Solder balls
- — Wire strands

— Solder splashes

Proposed Deviation

4.1 Contamination

1. Contamination by any foreign material that may affect surface resistivity of the printed circuit assembly is not acceptable.
2. Foreign material shall be removed by thorough cleaning. Particular care shall be taken to eliminate the following :
   — Metal chips
   — Flux concentrations (except flux from qualified no clean cored solder)
   — Filings
   — Rosin flakes
   — Clippings
   — Loosen terminal
   — Salt (food residue)
   — Solder balls
   — Wire strands
   — Solder splashes

1. Subhead 4.3, Acceptable (minimum)(Same as shown below in 4.3.2)

Original Text

4.3 Acceptable (minimum)

1. Wax from capacitors on the module, not in the area of the contact fingers or connectors.
2. Small quantities of thermal compound are acceptable on a module provided that it is not more than 1/16 of an inch (0.063 inch or 1.59 mm) from the component (containing compound) and does not contact another circuit.

Proposed Deviation

4.3 Acceptable (minimum)

Wax from capacitors on the module, not in the area of the contact fingers or connectors.
Small quantities of thermal compound are acceptable on a module provided that it is no more than 1/16 of an inch (0.063 inch or 1.59 mm) from the component (containing compound) and does not contact another circuit.

Flux residue from qualified no-clean, cored solder is acceptable on a module provided that it is not in the area of the contact fingers or connectors.

EL-MF299-0, Printed Circuit Boards/Modules, Cleaning Process Contamination

Heading 6, Interpreting the Test Data.

Original Text

No number has ever been identified that will cause a failure of the module. Therefore, any number below 20 micrograms of sodium chloride per square inch of module should be acceptable provided there is no visual contamination on the module such, as flux residues and oil.

Proposed Deviation

No number has ever been identified that will cause a failure of the module. Therefore, any number below 25 micrograms of sodium chloride per square inch of module should be acceptable provided there is no visual contamination on the module, such as flux residues (except flux from qualified no-clean, core solder) and oils.

4.2 DEVIATION: REPLACE TORQUED SCREW ASSEMBLIES ON HEAT SINK BY GLUING METHODOLOGY

Use thermally conductive adhesive to replace conventional screw-torqued assembly method of securing device onto low-voltage heat sink.

4.2.1 Background

The use of gluing methodology in place of torqued screws for heat sink assemblies will eliminate the need of a screw, insulator, washer, nut and in low voltage applications, the silicon insulation pad. Savings are realized in the elimination of associated hardware and decrease in labor.

4.2.2 Standards and Other Documents Affected

The standard affected by this deviation is:

DEC STD 030-5 Module Manufacturing Standard - Module Assembly and Component Insertion Rules.

Page 25, Paragraph: Rule 5650 Component Assembly Heat Sink Area Requirements

Original Text

When selecting a heat sink, a 0.100-inch area shall be left free of contaminants and other substances such as adhesives and/or labels in all four corners of ceramic surface mount devices that require heat sinks. This area is needed for the footprint of the chuck mechanism during pick-and-place. Heat sinks shall not exceed component body dimensions.

Proposed Deviation

When selecting a heat sink, a 0.100-inch area shall be left free of contaminants and other substances such as adhesives (except thermally conductive heat sink adhesive) and/or labels in all four corners of ceramic surface mount devices that require heat sinks. This area is needed for the footprint of the chuck mechanism during pick-and-place. Heat sinks shall not exceed component body dimensions.

APPENDIX A REFERENCED DOCUMENTS

A.1 EL-Class Digital Documents

EL-Class Number	Document Title
EL-00030-05	*DEC STD 030-5 Module Manufacturing Standard - Module Assembly and Component Insertion Rules*
EL-00055-00	*DEC STD 055-0 Requirements for Purchase Specifications*
EL-00092-00	*DEC STD 092-0 Finish and Color Standard - Introduction and General Requirements*
EL-00116-00	*DEC STD 116-0 Workmanship Standards Manual - Introduction*
EL-00116-01	*DEC STD 116-1 Workmanship Standards Manual - Printed-Circuit Boards*
EL-00156-00	*DEC STD 156-0 Introducing New Purchased Parts and Maintaining Purchased Parts Information: Standard Procedures*
EL-00176-00	*DEC STD 176-0 Printed-Wiring Board Acceptance Criteria*
EL-EN522-00	*Digital Qualification Process Manual*
EL-MF299-00	*Printed-Circuit Boards/Modules: Cleaning Process Contamination*

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